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DIALOG(R)File 351:Derwent WPI  
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**Covalently and ionically crosslinked polymer preparation, for use as electrochemical and separating membranes, comprises crosslinking acid-, sulfinate- and amine-functional polymers**

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Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
DE 10024576	A1	20011122	DE 1024576	A	20000519	200221 B
<b>WO 200187992</b>	A2	20011122	WO 2001EP5644	A	20010517	200221
AU 200181776	A	20011126	AU 200181776	A	20010517	200222
EP 1292632	A2	20030319	EP 2001960223	A	20010517	200322
			WO 2001EP5644	A	20010517	
BR 200110876	A	20030311	BR 200110876	A	20010517	200323
			WO 2001EP5644	A	20010517	
KR 2003007583	A	20030123	KR 2002714862	A	20021106	200336
CN 1433442	A	20030730	CN 2001809773	A	20010517	200365
<b>US 20030208014</b>	A1	20031106	WO 2001EP5644	A	20010517	200374
			US 2003275854	A	20030512	
JP 2003533560	W	20031111	JP 2001585209	A	20010517	200375
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US 20030208014 A1 C08F-130/04  
JP 2003533560 W 50 C08G-085/00 Based on patent WO 200187992

Abstract (Basic): DE 10024576 A1

**NOVELTY** - Covalently and ionically crosslinked polymers (I) are prepared by crosslinking polymers having acid groups, polymers having sulfinate groups and polymers having tertiary amine groups with polyfunctional haloalkanes or haloaromatics.

**DETAILED DESCRIPTION** - Covalently and ionically crosslinked polymers (I), including blends of (I) and membranes comprising (I), are prepared by crosslinking polymers having acid groups of formula (II), (III) and/or (IV), polymers having sulfinate groups of formula (V) and polymers having tertiary amine groups of formula (VI) with polyfunctional haloalkanes or haloaromatics to form crosslinks of formula (Ia)-(Ic).

SO3M (II)

PO2M2 (III)

COOM (IV)

SO2M (V)

NR2 (VI)

polymer-SO2-Y-polymer (Ia)

M=H, metal or ammonium;

R=alkyl, hydroxyalkyl or aryl, or NR2 is pyridyl or another tertiary N-containing heteroaromatic or heterocyclic group;

X=Hal or OR;

Hal=F, Cl, Br or I;

Y=(CH<sub>2</sub>)<sub>x</sub>, arylene, (CH<sub>2</sub>)<sub>x</sub>-arylene or CH<sub>2</sub>-arylene-CH<sub>2</sub>; and

x=3-12.

An INDEPENDENT CLAIM is also included for the preparation of (I), comprising: dissolving the polymers in N,N-dimethylformamide, N,N-dimethylacetamide, N-methylpyrrolidone (NMP), dimethyl sulfoxide or sulfolane; adding the crosslinker; homogeneously dispersing the crosslinker in the polymer solution by stirring; filtering and degassing the polymer solution; spreading a thin film of the polymer solution on a substrate (e.g. a glass or metal plate or a woven or non-woven fabric); removing the solvent by heating to 80-130 degrees C and/or applying a vacuum or in a circulating-air dryer; optionally removing the film from the substrate; and treating the film in dilute (1-70%) mineral acid and then deionized water at a temperature between room temperature and 95 degrees C.

**USE** - Membranes comprising (I) are useful both in electrochemical applications, especially fuel cells (operating with hydrogen or methanol at 0-180 degrees C), electrochemical cells, secondary batteries and electrolysis cells, and in membrane separation processes, e.g. gas separation, pervaporation, perstraction, reverse osmosis,

electrodialysis or dialysis.

**ADVANTAGE - (I)** combine the hydrolytic stability of covalently crosslinked polymers with the flexibility and good water retention of ionically crosslinked polymers.